**Hao Luo Wang, Andrei David Radu**
KTH Royal Institute of Technology

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# Digiways – Digitalisation of Highway Traffic, Air Pollution and Operations based on CPS

Cyber-physical systems were invented as a conceptual framework to integrate physical systems, sensors and actuators, with computer models in cyberspace to implement modern control methodologies. In intelligent transport systems, cyber-physical systems are applied to build intelligent system solutions, and even develop digital twins of real transport and infrastructure systems. The union of physical and digital systems is made in a seamless way, enabling feedback loops where digital processes will impact on the physical world and vice-versa. Future intelligent transport systems see cyberspace models in decentralized edges or clouds, whereas the physical assets may find a secure and efficient environment to establish low-latency communications and cross-functional collaboration supporting decision-making from a system-level perspective.
This project presents a detailed framework to create the future cyber-physical highway traffic management system. E4S highway in Stockholm (Sweden) is selected as a case study to test the presented framework. The digital twin model of the E4S is implemented based on the SUMO microsimulation platform through its Aplication Programming Iinterface, as a proof-of-concept. All physical assets are also modelled with their virtual representation, including a variety of traffic sensor technology (MCS, V2X, drone, AQ sensor). The digital twin will be run in parallel with the real world, replicating real traffic behaviour. By leveraging the power of edge computing, real-time traffic data and synthetic simulation data will be combined to enable the capability of predicting traffic state varying in time and space. Working together with optimal control functionalities, the digital twin will provide data-driven decisions to be translated into control actions in the real traffic system.